A STUDY ON COMMUNITY PARTICIPATION IN MALARIA CONTROL

II. Malaria Intervention Studies in Berakit Village, Riau Province, Sumatra*

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ABSTRAK

Telah dilakukan survei malariometrik dan survei sosiologi di desa Berakit, Propinsi Riau, dalam menanggulangi penyakit malaria dengan kemoprofilaksis melalui peran serta masyarakat. Hasil penelitian menunjukkan bahwa daerah tersebut adalah hiperendemik dan pengetahuan penduduk mengenai malaria masih rendah. Suatu "learning module" telah dibagikan kepada mereka melalui 9 orang pelopor yang dipilih oleh masyarakat. Tablet klorokuin dibagikan seminggu sekali sebagai intervensi profilaksis selama 2 tahun. Hasilnya menunjukkan adanya penurunan angka limpa dan angka parasit pada 529 orang penduduk, di antaranya adalah 159 anak umur 2 — 9 tahun (berturut-turut dari 54.3 % menjadi 21.8 % dan dari 69,2 % menjadi 27.6 % untuk angka limpa dan dari 13.2 % menjadi 2.6 % dan dari 24.5 % menjadi 6.8 % untuk angka parasit).

Spesies parasit yang ditemukan adalah *Plasmodium falciparum* dan *P. vivax*, sedangkan infeksi campur dan *P. malariae* yang ditemukan pada survei pra-intervensi tidak dijumpai lagi pada akhir penelitian.

Survei sosiologi mengenai respons penduduk terhadap "learning module" menunjukkan bahwa penduduk dapat menggunakannya dengan baik. Mereka sadar bahwa peran serta masyarakat adalah penting untuk menanggulangi penyakit malaria di desanya.

Aspek entomologi dilakukan oleh Subdirektorat Entomologi P2M-PLP Jakarta dan datanya masih dalam pengolahan.

Walaupun demikian, dapat disimpulkan bahwa kemoprofilaksis dengan penyuluhan kesehatan yang tepat pada masyarakat dapat dilakukan seperti terlihat pada hasil penelitian ini di desa Berakit, Propinsi Riau.

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INTRODUCTION

The first year precontrol malariometric survey in 1982 established that malaria was hyperendemic in Berakit village. Baseline information on the social cultural aspects of the community in relation to their approaches of the disease were also studied[1]. In the succeeding years of 1983/1984 and 1984/1985, malaria intervention by chloroquine treatment through community participation and sociological studies based on the "illustrated learning module" of malaria prevention and control were implemented to find out (1) the effectiveness of the changing attitude of the community's participation in the control of malaria through the "learning module" in villages with low education levels and (2) the effectiveness of community participation in the control of malaria by chemoprophylaxis.

Malariometric and sociological post-treatment surveys revealed that (1) community participation in drug prophylaxis was quite successful, and (2) the directives in the "learning module" have an impact on the community's concerted efforts in the control of the disease.

The results of these studies are presented in this paper.

Study Area

The present study was conducted in the same study area, which had been very well described by Pribadi et al (1985)[1], namely in the subvillage RK 1 in Berakit village, Riau Province, Sumatra, Indonesia.

MATERIALS AND METHODS

Sociological data were collected through interviews based on the receptives of the "illustrated learning module". Malariometric surveys were carried out in the same subvillage as in the precontrol surveys. The sampling method of malaria and spleen examinations were done according to the previous study (Pribadi et al, 1985)[1]. The drug used for the weekly chemoprophylaxis was chloroquine in tablet form given orally for a period of two years.

The dosage of chloroquine was as follows :

Age group (in years)	Weekly dosage of chloroquine (1 tablet = 150 mg base)
0 – < 1	¼ tablet
1 – 4	½ tablet
5 – 9	1 tablet
10 – 14	1½ tablet
>15	2 tablet

Delivery of the drug to the community in the subvillage RK 1 with its 5 RTs was carried out by 9 key persons. They were school teachers, head of the RTs and active young people, selected by the community and accepted by the villagers. The key persons, called cadres or facilitators, were coordinated by the head of the village. The chosen cadres with different levels of education were given health education by the health officials and members of the team about malaria, its symptoms and signs, transmission of the disease by *Anopheles* mosquitoes and the recognition of malaria cases in the community. They were taught

also to recognize malaria fever and anemia. The cadres were also coached to give health educations about malaria to heads of households and members of the family. Most of the villagers have a low degree of education. Health education about malaria was carried out through a specially designed "illustrated learning module", consisting of colored drawings and simple texts about malaria in the form of a flip chart so that illiterate people could understand the message. The cadres distributed the "learning module" to heads of households. With the aid of this tool, health education about malaria was carried out door to door or during a meeting in the prayer houses of the subvillage. According to a census carried out, the population of RK 1 with its 5 RTs was 733, comprised of 154 households.

RESULTS

Spleen rates

Table 1 shows the spleen rates of all ages of respondents for both sexes during pre-and post-treatment surveys. The results of overall positive spleen rates of all ages during the first two years of pre-treatment in 1982 and 1983 were 46.3 % and 54.3 % which were reduced to 21.7 % and 21.8 % respectively after the 1st and 2nd post-treatments in 1984 and 1985. The positive spleen rates among the four age-groups (0—4, 5—9, 10—14. > 15) were reduced by more than 50 % in each of these age-groups after the 1984 and 1985 post-treatments as compared to pre-treatment results in 1982 and 1983.

The overall spleen rates of children 0 - 9 years old during the two pre-treatments in 1982 and 1983 were, 51 5% and 63.7 % which were reduced to 28.4 % and 26.3% respectively after the 1st and 2nd post treatments in 1984 and 1985. The spleen rates of the three age groups (0 — < 1,1 — < 2, 2 — 9), showed more than a 50 % reduction.

Malaria parasite rates

Table 2 shows the parasite rates of all ages of respondents for both males and females during pre-and post-treatment surveys. The overall parasite rates for all ages during the two years of pre-treatment in 1982 and 1983 were 14.8 % and 13.2% respecitively. These rates were significantly reduced to 4.5 % and 2.6 % after the post-treatments in 1984 and 1985. The parasite rates of the four age-groups (0—4, 5—9, 10—14, > 15) showed no marked difference between the pre-treatment in 1982 and 1983. The parasite rates of these age-groups were substantially reduced by more than 60—90% after post-treatments in 1984 and 1985; the overall parasite rates of children 0—9 years old was reduced from 26.0% and 26.9% to 7.8% and 6.6% respectively during the 1st and 2nd pre-treatment surveys. After the second year post-treatment the rate among the three age-groups (0 — < 1, 1 — > 2, 2 — 9) was reduced to 6.6% from 26.9% during the second year pretreatment surveys.

Follow up splenomegaly cases of pre-and post-treatment surveys.

A comparison of normal and enlarged spleens in 270 follow up cases during pre-treatment in 1983, 1st and 2 nd post treatments in 1984 and 1985 were examined the results are presented in Table 3a. A total of 123 cases (45.6%) with

Table 1. Percentage of spleen cases in different age-groups by sex between pre- and post-treatment at Berakit village, Riau Province, Sumatra, Indonesia.

Type of surveys	1st pre-treatment survey (November 1982)						2nd pre-treatment survey (November 1983)						1st post-treatment survey (November 1984)						2 nd post-treatment survey (November 1985)						Calculated reduction rates (CRR)	
Sex	Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total		Pre-1983 and post-treatment 1984	1st and 2nd year post-treatment
a = No. exam b = % positive	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
Age-group																										
0 – 4	56	39.3	47	44.7	103	41.7	52	50.0	43	74.4	95	61.1	50	24.0	45	20.0	95	22.1	43	20.9	27	18.5	70	20.0	63.5	9.5
5 – 9	48	66.7	53	66.0	101	66.3	49	65.3	49	67.3	98	66.3	53	35.8	56	32.1	109	33.9	46	34.8	51	27.5	97	30.9	48.9	8.8
10 – 14	31	67.7	38	36.8	69	50.7	19	63.2	34	58.8	53	60.4	28	25.0	38	42.1	66	34.8	27	25.9	45	42.2	72	36.1	42.3	–3.7
> 15	163	38.0	151	43.0	314	40.4	140	46.4	143	46.8	283	46.6	170	10.6	158	19.6	328	14.9	120	10.8	141	18.4	261	14.9	68.0	0.0
Total	298	16.4	289	46.7	587	46.3	260	51.9	269	54.6	529	54.3	301	18.6	297	24.9	598	21.7	236	19.1	264	24.2	500	21.8	60.0	–0.5
Age-group																										
0 – < 1	16	31.3	7	0	23	21.7	6	16.6	5	60.0	11	36.4	5	0	6	16.7	11	9.1	7	28.6	3	0	10	20.0	75.0	–119.8
1 – < 2	4	50.0	7	42.9	11	45.5	15	40.0	8	39.5	23	39.1	11	18.2	4	25.0	15	20.0	10	10.0	2	50.0	12	16.7	48.8	16.5
2 – 9	84	56.0	86	60.5	170	58.2	80	63.8	79	74.7	159	69.2	87	33.3	91	27.5	178	30.3	72	30.6	73	24.7	145	27.6	56.2	8.9
Total	104	51.9	100	55.0	204	51.5	101	57.4	92	70.7	193	63.7	103	30.1	101	26.7	204	28.4	89	28.1	78	24.3	167	26.3	55.4	7.4

Table 2. Percentage of malaria cases in different age-groups by sex between pre- and post-treatment surveys at Berakit village, Riau Province, Sumatra, Indonesia

Type of surveys	1st pre-treatment survey (November 1982)						2nd pre-treatment survey (November 1983)						1st post-treatment survey (November 1984)						2nd post-treatment survey (November 1985)						Calculated reduction rates (CRR)	
Sex	Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total		Pre-1983 and post-treatment 1984	1st and 2nd year post-treatment
a = No. exam b = % positive	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
Age-group																										
0 – 4	60	30.0	51	33.3	111	31.5	52	36.5	43	34.9	95	35.8	50	12.0	45	13.3	95	12.6	43	7.0	27	11.1	70	8.6	64.8	31.7
5 – 9	38	23.4	50	16.0	97	19.6	49	14.3	49	22.4	98	18.4	53	7.5	56	0	109	3.7	46	4.3	51	5.9	97	5.2	79.9	40.5
10 – 14	32	9.4	40	12.5	72	11.1	19	5.3	34	11.8	53	9.4	28	3.6	38	2.6	66	3.0	27	0	45	0	72	0	68.1	100.0
⩾15	160	10.6	154	5.8	314	8.3	140	5.7	143	3.5	283	4.6	170	1.8	158	3.8	328	2.7	120	0.8	141	0.7	261	0.8	41.3	70.4
Total	299	16.4	295	13.2	594	14.8	260	13.5	269	13.0	529	13.2	301	4.7	297	4.4	598	4.5	236	2.5	264	2.7	500	2.6	65.9	42.2
Age-group																										
0 – < 1	18	16.7	8	12.5	26	15.4	6	50.0	5	20.0	11	36.4	5	20.0	6	16.7	11	18.2	7	14.3	3	0	10	10.0	50.0	45.1
1 – < 2	4	25.0	7	14.3	11	18.2	15	46.7	8	25.0	23	39.1	11	9.1	4	50.0	15	20.0	10	0	2	0	12	0	48.8	100.0
2 – 9	85	29.4	86	26.7	171	28.1	80	20.0	79	29.1	159	24.5	87	10.3	91	2.2	178	6.2	72	5.6	73	8.2	145	6.8	74.7	–9.7
Total	107	27.1	101	24.8	208	26.0	101	25.7	92	28.3	193	26.9	103	10.7	101	5.0	204	7.8	89	5.6	78	7.7	167	6.6	71.0	15.4

normal spleens examined during pre-and post-treatments were found in all age-groups (N—N—N) and Table 3b (13.3%) with spleens still enlarged (E—E—E). The spleen of 7 cases (2.6%) with previously normal spleen was found enlarged at the time of post-treatment surveys (N-N-E and N-E-E) while a conversion to normal was observed in 84 cases (31.1%) (E—E—N and E—N—N).

The results of follow up examinations among 100 children of 2—9 years old (Table 3a) showed 34.0% with persistent normal spleens (N—N—N—), and 17.0% with persistent enlarged spleens (E—E—E), the incidence being 5.0% (N—N—E and N—E—E) and the conversion 35.0% (E—E—N and E—N—N).

Follow up Malaria Cases of Pre-and Post-treatment Surveys

Comparison of malaria negative and positive slides examined in 270 follow up cases of all age-groups is presented in Table 3b. Persistent negative slides examined at three consecutive times (pre-, 1 st year and 2 nd year post-treatment) were obserbed in 221 cases (81.9%) (— — —). Only previously negative slides of 2 cases were positive (0.7%) when examined at the post-treatment surveys (— — + and — + +) and a conversion rate of 36 (13.3%) (+ — — and + + —) was observed. Previously negative slides of 9 cases (3.3%) were positive after the 1st year chemoprophylaxis, but became negative again after the 2nd year prophylaxis

Tabel 3a. The spleen in 270 follow-up cases examined at the time of pre-treatment (November 1983), 1st post-treatment (November 1984) and 2nd post-treatment (November 1985) surveys at Berakit village, Riau Province, Sumatra, Indonesia.

Age group	Spleen								
	N - N - N	N - N - E	N - E - E	N - E - N	E - N - N	E - E - N	E - N - E	E - E - E	Total
0 – 4	19 (38.8)	2 (4.1)	1 (2.0)	1 (2.0)	8 (16.3)	6 (12.2)	2 (4.1)	10 (20.4)	49
5 – 9	15 (29.4)	1 (2.0)	1 (2.0)	2 (4.0)	15 (20.4)	6 (11.8)	4 (7.8)	7 (13.7)	51
10 – 14	11 (42.3)	0	0	1 (3.8)	5 (19.2)	3 (11.5)	2 (7.7)	4 (15.4)	26
> 15	78 (54.2)	2 (1.4)	0	1 (0.7)	28 (19.4)	13 (9.0)	7 (4.9)	15 (10.4)	144
	123 (45.6)	5 (1.9)	2 (0.7)	5 (1.9)	56 (20.7)	28 (10.4)	15 (5.6)	36 (13.3)	270
Total		7 (2.6)			84 (31.1)				
Age Group									
0 – <1	1 (25.0)	1 (25.0)	0	0	1 (25.0)	1 (25.0)	0	0	4
1 – <2	8 (88.9)	0	0	0	0	1((11.1)	0	0	9
2 – 9	25 (28.7)	2 (2.3)	2 (2.3)	3 (3.4)	22 (25.3)	10 (11.5)	6 (6.9)	17 (19.5)	87
	34 (34.0)	3 (3.0)	2 (2.0)	3 (3.0)	23 (23.0)	12 (12.0)	6 (6.0)	17 (17.0)	100
Total		5 (5.0)			35 (35.0)				

N = Normal spleen
E = Enlarged spleen
Figure in parenthesis denotes the percentage

(— + —). Similarly, previous positive slides of 2 cases (0.7%) were converted to negative at the 1st year post-treatment, but became positive again at the 2nd year post-treatment (+ — +). Persistent positive slides (+ + +) were not encountered.

P. falciparum was predominant, followed by *P. vivax* with *P. malariae* the least encountered. Mixed infections of these parasites were also found, but the rates were low. In post-treatment surveys, only two species were identified, namely *P.*

Table 3b Malaria infection in 270 follow-up cases examined at the time of pre-treatment (Nov. 1983), 1st post-treatment (Nov. 1984) and 2nd post-treatment (Nov. 1985) surveys at Berakit village, Riau Province, Sumatra, Indonesia.

Age group	Malaria parasites								
	— — —	— — +	— + +	— + —	+ — —	+ + —	+ — +	+ + +	Total
0 – 4	28 (57.1)	0	0	2 (4.1)	13 (26.5)	2 (4.1)	2 (4.1)	0	49
6 – 9	37 (72.5)	2 (3.9)	0	2 (3.9)	12 (23.5)	0	0	0	51
10 – 14	23 (88.5)	0	0	1 (3.8)	2 (7.7)	0	0	0	26
>15	133 (92.4)	0	0	4 (2.8)	7 (4.9)	0	0	0	144
Total	221 (81.9)	2 (0.7)	0	9 (3.3)	34 (12.6)	2 (0.7)	2 (0.7)	0	270
		2 (0.7)			36 (13.3)				
Age group									
0 – < 1	1 (25.0)	0	0	0	1 (25.0)	1 (25.0)	1 (25.0)	0	4
1 – < 2	6 (66.7)	0	0	0	3 (33.3)	0	0	0	9
2 – 9	58 (66.7)	2 (2.3)	0	4 (4.6)	21 (24.1)	1 (1.1)	2 (2.3)	0	87
Total	86 (86.0)	2 (2.0)	0	4 (4.0)	25 (25.0)	2 (2.0)	3 (3.0)	0	100
		2 (2.0)			(27 (27.0)				

— = negative malaria
\+ = positive malaria
Figure in parenthesis denotes the percentage

Malaria Parasite Species

Malaria parasites were found in the blood specimens of 88 and 72 villagers during the lst and 2nd pre-treatment surveys. In the 1st and 2nd post-treatment surveys they were found in 28 and 13 people. Three parasites species were identified, namely *Plasmodium falciparum, P. vivax* and *P. malariae.* The results are presented in Table 4.

The percentage of the distribution of these parasites vary from the 1st year to that of 2nd year pre-treatment survey; however, *falciparum* and *P. vivax* with the former being predominant than the latter. Mixed infection was not observed.

Sociological Surveys.

In 1984, sociological surveys were carried out during the malaria intervention period to find out whether the directives in the "illustrated learning module" were followed, and to assess the effectiveness of malaria control by community participation in the endemic area under study.

Sosial Status of Heads of Families

A total of 145 out of 154 heads of households (54.2%) were interviewed. They were responsible for community participation in the malaria intervention studies. Information on their social status were obtained, and presented in Table 5.

Source of Malaria Knowledge obtained

Questionnaires were distributed to each of the 145 heads of households to assess their knowledge about malaria and through what sources this knowledge was obtained. Their responses to these questionnaires were shown in Table 6.

Tabel 4. Distribution of parasite spp. in different age-groups by sex between pre- and post-treatment surveys at Berakit Village, Riau Province, Sumatra, Indonesia.

Age group	Sex	1st Pre-treatment survey (Nov. 1982)					2nd Pre-treatment survey (Nov. 1983)					1st Post-treatment survey (Nov. 1984)					2nd Post-treatment survey (Nov. 1985)				
		Pf	Pv	Pm	Mx	Total	Pf	Pv	Pm	Mx	Total	Pf	Pv	Pm	Mx	Total	Pf	Pv	Pm	M	Total
0 – 4	M	11	7	0	0	18	6	10	1	1	18	2	4	0	0	6	3	0	0	0	3
	F	9	6	0	2	17	3	12	1	0	16	1	4	0	0	5	3	3	0	0	3
5 – 9	M	6	4	1	0	11	1	3	2	1	7	4	1	0	0	5	1	1	0	0	2
	F	6	2	0	0	8	6	5	0	0	11	0	0	0	0	0	3	1	0	0	3
10 – 14	M	3	0	0	0	3	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0
	F	5	0	0	0	5	0	4	0	0	4	1	0	0	0	1	0	0	0	0	0
⩾ 15	M	15	2	0	0	17	4	5	0	0	9	2	2	0	0	4	0	1	0	0	1
	F	8	1	0	0	9	5	1	0	0	6	7	0	0	0	7	1	0	0	0	1
	M	35	13	1	0	49	12	18	3	2	35	8	7	0	0	15	4	2	0	0	6
	F	28	9	0	2	39	14	22	1	0	37	9	4	0	0	13	7	0	0	0	7
Total		63	22	1	2	88	26	40	4	2	72	17	11	0	0	28	11	2	0	0	13
Parasite spp. %		71.6	25	1.1	2.3		36.1	55.6	5.6	2.8		60.7	39.3	0	0		84.6	15.4	0	0	

Pf = Plasmodium falciparum
Pv = P. vivax
Pm = P.malariae
Mx = mixed infection

M = male
F = female

Of the 145 heads of households interviewed, 68.3% have attended some forms of schooling and were considered literate having the ability to communicate literally. Only 54. 4% of the villagers were original residents of the village, while the rest were migrants who have been there long enough and became permanent residents in the village.

It was apparent from the interviews that the "learning module" was most effective in disseminating knowledge on malaria to the community. The high percentage of participation shown by village volunteers and health cadres did also reflect the efficacy of the "learning module" distributed to these organizations beforehand.

Table 5. Information obtained from 145 heads of families at Berakit village, Riau Province, Sumatra. Indonesia.

Age group (years)	%	Education	%	Ocupation	%	Type of residents	%
< 30	18.0	No schooling	31.7	Farming	71.0	Original	54.5
31 – 40	32.4	Incomplete primary schooling	37.3	Other job	29.0	Permanent residents	45.5
41 – 50	17.2	Completed primary schooling	26.2				
> 51	32.4	Attending secondary & higher schooling	4.8				
	100		100		100		100

Table 6. Percentage of responses by 145 heads of families in Berakit village.

Source of information	% of responses	
	1st visit	2nd visit after 2 months
1. "Learning module"	42.8	36.6
2. Village volunteers	32.4	35.9
3. Research team from Jakarta	1.4.	11.0
4. Health centers	11.7	11.7
5. Radio / TV.	2.0	2.0

Responses to Directives in the Learning Module.

Eight directives were formulated in the "learning module". Responses by these heads of households from each of these directives were obtained, and the results were shown in Table 7.

The responses to the various directives in the "learning module" showed that these family heads were able to follow and understand the directives. Knowledge on the type of malaria vector mosquitous, its habitats and its transmission on the disease to man, were easily gained by

Table 7. Responses and implementation to the directives in the "learning module" by 145 heads of families in Berakit village.

Directives of the "learning module"	% of responses
1. Malaria mosquito	88.3
2. Habitats of malaria mosquito	83.2
3. Symptoms of malaria: a. fever	25.5
b. enlarged spleen	63.5
4. Malaria transmission through mosquito	81.4
5. Visit to health center during illness	
6. Acceptance of antimalaria pill through doctors and health workers in health centers	71.7
7. Knowledge of malaria prevention	
a. use of mosquito nets	31.0
b. insecticide spraying	2.8
c. mosquito coils	57.2
d. d. induced smoking	1.9
e. kept doors and windows closed	0.7
8. Environmental sanitation (clearing shrubs near houses and nearby streams, maintain flowing water in streams)	80.0

studying the illustrated charts in the" learning module". On the symptoms of malaria, such as fevers and enlarged spleen, recognition of the latter symptom was more obvious than the former. The directives on control measures, such as mechanical (chemical, and induced malaria measures), and environmental (source reduction) were followed and adapted. The implementation of the mechanical control measures was not as good as that of the environmental ones. This was probably due to lack of income resources of the community. Labor intensive measures, such as environmental control were able to receive greater inducement because no financial support is involved. The responses and implementations of the directives in the "learning module" further support the effectiveness of this "learning module" to induce community participation for malaria control.

Dissemination of Malaria Knowledge During Anti-Malaria Drugs Distribution by the Health volunteers

Dissemination of malaria knowledge in the "learning module" to the Family heads was on the first week of each month by the health volunteers; 95.1% of the 145 family heads discussed the malaria disease in their houses, 56.6% during gatherings between the volunteers and

family heads, 46.2% during meetings, and 37.9% during their daily work. During weekly and occasional religious praying days, the health volunteers also took their opportunities to draw the attention of the community to the malaria knowledge in the "learning module".

The family heads also disseminated the malaria knowledge in the "learning module" to their neighbours beside their own family members, and also to family visitors; 58.6% of 145 family heads disseminated malaria knowledge to their neighbours, 70.3% to their family members and close friends, 31.7% to their visitor, and 14,5% to communities outside their village. The health volunteers were responsible for the distribution of the antimalaria drugs to the family heads; 72.5% of 145 family heads recived the drugs weekly, while 27% of the village heads did not receive the drugs weekly and complained that the health volunteers sometimes did not distribute at weekly intervals.
distribute at weekly intervals. Of the 145 family heads, two failed to obtain the drugs from the health volunteers. One was a bachelor and the reason for the other was not known.

Prophylactic Malaria Treatment

The survey showed that 89.0% of the 145 family heads would like to use chloroquine as malaria prevention by obtaining the drugs themselves when the study will be discontinued. Several alternatives. in obtaining this drug were suggested. The responses indicated that 8% chose self support, 47.6% chose collective support, 71.1% would like to request or buy form Health Officers and 34.5% requested support from village heads. These responses implied that the community in Berakit village was very concerned about malaria and its prevention.

CONCLUSION

A pilot control program of malaria by chemotherapeutic treatment through community participation was initiated in 1982 in Berakit village, Riau Province, Sumatera. Biomedical and sociological surveys were carried out in the study area. The results of the first year pre-treatment survey revealed that malaria was hyperendemic in the village while there was a confused understanding among the residents in the village about the knowledge of malaria disease[1]. In the second year pre-treatment survey in 1983, the overall parasite and spleen rates of infected villagers were equally high during both years. Health education based on a malaria "learning module" an illustrated manual for recognizing the vectors that transmit the disease, method of controlling the vectors and personal and environmental hygiene for preventive measures was distributed to the community and volunteer health workers to educate them and promote community participation as an additional tool to the drug distributions.

Malaria intervention by chloroquine treatment was initiated. The drug was distributed weekly through volunteer health workers to the head of each family in the village. The first year chemoprophylactic treatment started in November 1984, and follow-up of this treatment was again carried out in November 1985. At the same time, health education using the malaria "learning module" in the different strata of the community was intensified. The two years of malaria intervention by drug treatment supported by community participation showed promising results. The overall spleen rate of

54.3% during the second pre-treatment in 1983 was reduced to 21.8% after two years of post-treatment, showing calculated reduction rate (CRR) of 59.8%. In the age-group of 2—9 years old, the spleen rate was reduced from 63.7% to 26.3% and the CRR was 60.1%. Follow-up examination of 270 cases, the incidence of spleen enlargement (from normal to enlarged) was 2,6% compared to the conversion rate of 31.1% from enlarged to normal spleen after post treatments. Similary, re-examinations of 100 children of 2—9 years old showed that the incidence and the conversion rate differed markedly, being 5.0% and 35.0% respectively.

The parasite rate was also substantially reduced after the intervention. The overall rate of 13.2% in 529 cases during pre-treatment in 1983, was reduced to 2.6% after post-treatments and the CRR was 80.3% Among the 2 -- 9 years age-group, it was reduced from 26.9% to 6.6% with a CRR of 72.2%. Follow-up examinations of 270 individuals, revealed that incidence form revealed negative to positive malaria was lower than the conversion rate from positive to negative, the rates being 0% and 13.3% respectively.

After post-treatment, the predominant malaria parasites were *P falciparum* and *P. vivax*, while mixed infection and *P. malariae* found during pre-treatment, were not present.

Sociological survey on the responses to the malaria "learning module" showed that a high percentage of the community was able to make use of the directives provided. This particular additional visual aids as health education tool played an important role in inducing malaria knowledge to the community. The community, through the help of this visual aids tool was able to realize that the disease problem in the village was the by-product of their own behaviour, and they themselves should play a prominant role in combating the disease. The program was able to promote and educate the community in the affected village, that united community efforts were essential to overcome their problems for self preservation, irrespective of the problem whether health or any other social problem. The entomological studies, particulary the mosquito vectors and their seasonal prevalence in relation to the natural infectivity, etc. were carried out by the Subdirectorate of Entomology, CDC/Jakarta. It was most unfortunate that entomological information was yet to become available. Therefore, the impact of chemoprophylaxis on the transmission levels between the host and the mosquito vectors still need to be intepreted by the investigator concerned. The results of this trial would have been more complete if the mosquito data were incorporated in the overall interpretation of this study. Despite this setback, it would be concluded that chemopropylaxis together with a properly guided health education programme by community efforts were feasible as evidenced by the results of this pilot project in the Berakit village, Riau Province, Sumatera.

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